1974

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A.S. Series 74-5

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Feed additives have become an important part of rations for feedlot cattle during the past several years. They have been shown to bring about improved performance in various ways such as stimulating growth, favorable alterations in fermentative and synthetic activity of the digestive tract and improvement in general health of the animals allowing more efficient absorption and utilization of nutrients consumed.

Much research has been devoted to the search for and study of compounds or products that may have important economic value as feed additives. Recent research has shown that monensin is such a compound. Monensin is a biologically active compound produced by streptomyces cinnamonensis and is used as an anticoccidial for poultry. It has been shown to favorably alter rumen fermentation resulting in an increase in propionic acid production which should be expected to improve feed efficiency.

In the experiment reported, monensin was tested at various levels as to effects on feedlot performance of steers during a growing phase with high-roughage rations and during a finishing phase with high-concentrate rations.

Procedures

The 128 Hereford steers used in the experiment were purchased in mid-May. They had been wintered as one group using a ration of alfalfa hay, corn silage and about 5 lb. of oats. Average weight at time of purchase was 608 pounds. They had been treated for control of internal and external parasites and had been given the vaccinations commonly associated with preconditioning and no additional treatments were given after arrival.

During a preliminary period of about 6 weeks, the steers were fed once daily a ration of 5 lb. whole corn grain and a full feed of alfalfa-bromegrass haylage (about 45% moisture).

High-Roughage Phase

Following the preliminary period, the cattle were allotted on basis of weight into 16 pens of 8 head each. Ration treatments were monensin at 0, 10, 20 or 30 g

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[a]Monensin used in the experiment supplied by Eli Lilly and Company, Greenfield, Indiana, through the courtesy of Dr. H. P. Grueter.

Prepared for the Eighteenth Annual Beef Cattle Feeders Day, November 1, 1974.

per ton of air-dry ration. Each level of monensin was administered to four pens of cattle, two of which were fed alfalfa-bromegrass hay and two alfalfa-bromegrass haylage.

Rations during the high-roughage phase contained 75% alfalfa-bromegrass forage (hay or haylage) and 25% concentrates (corn and supplements) on an air-dry basis (90% dry matter). No supplemental protein was considered necessary with the high level of forage. However, a supplement was prepared to provide supplemental minerals, vitamin A and the test levels of monensin. These were mixed with ground corn and was supplemented at 5% of the air-dry ration. The control supplement contained 84% ground corn, 10% dicalcium phosphate and 6% trace mineral salt. Vitamin A was added to furnish 1,000 IU per pound of ration. A monensin premix was used to provide the test levels of the compound and replaced an equal weight of corn in the supplement. The final air-dry ration was 75% alfalfa-bromegrass forage, 20% ground corn and 5% supplement.

The ratio of 75% roughage to 25% concentrates on an air-dry basis was computed to the equivalent ratio as fed from moisture contents of feed determined periodically during the experiment. The concentrate mixture (corn and supplement) was also computed to an as-fed basis from moisture contents of the feeds. It was batch mixed daily with the roughage but not mixed together prior to feeding.

The cattle were fed in outside, paved pens without shade or shelter. This phase of the experiment was terminated after 111 days.

High-Concentrate Finishing Phase

Following termination of the high-roughage phase of the experiment, the steers were changed to high-concentrate rations. There were no changes in location or pen allotment. Final weights for the previous phase were used as the initial weights for this phase of the experiment. Experimental treatments for each pen of cattle were the same as during the high-roughage phase except for changes in the ratio of concentrates to roughage.

Rations contained 90% concentrates and 10% roughage (alfalfa-bromegrass hay or haylage) on an air-dry basis (90% dry matter). The cattle were changed from the previous high-roughage rations to the high-concentrate ones over a period of about 10 days.

A supplement to provide 10% of the air-dry ration was mixed with the corn in the same manner as for the previous phase. Ingredient composition of the control supplement was 83% ground corn, 4% urea (45% N), 5% dicalcium phosphate, 5% limestone and 3% trace mineral salt. Vitamin A was added to provide 1,500 IU per pound of air-dry ration. A monensin premix was used to provide the test levels (0, 10, 20 or 30 g/ton of air-dry ration) of the compound and replaced an equal weight of corn.

Appropriate levels of feeds as fed were computed from moisture contents of feed as during the previous phase of the experiment. Concentrates and roughage were fed separately once daily in amounts to be nearly consumed by the next feeding.

The experiment was terminated after 106 days of the finishing phase and the cattle marketed. Carcass data were obtained upon slaughter.

Results

High-Roughage Growing Phase

Results of the 111-day high-roughage phase of the experiment are presented in table 1. Rates of gain were high for the type of diet fed but with only small differences between treatment groups (2.48 to 2.53 lb. daily). Therefore, monensin appeared to have no effect on weight gains of the cattle.

Table 1. Monensin for Growing and Finishing Cattle for High-Roughage Phase (June 21 to Oct. 10--111 days)

	Monensin, g/ton air-dry feed			
	0	10	20	30
No. of animals	32	32	32	32
Init. shrunk wt., lb.	636.4	634.8	634.8	635.0
Final shrunk wt., lb.	911.4	911.1	915.9	909.7
Avg. daily gain, lb.	2.48	2.49	2.53	2.48
Avg. daily feed (air-dry), lb.				
Hay or haylage	19.93	19.26	18.81	17.83
Suppl.	1.32	1.28	1.25	1.19
Corn	5.36	5.17	5.05	4.79
Total	26.61	25.71	25.11	23.81
Feed/100 lb. gain (air-dry), lb.				
Hay or haylage	808	774	743	723
Suppl.	53	52	49	49
Corn	217	208	199	194
Total	1078	1034	991	966

Feed consumption decreased with increasing levels of monensin in the rations. The decrease in feed consumption but with similar rates of gain resulted in an improvement in feed efficiency with increasing levels of the compound. The improvement amounted to 4.1, 8.1 and 10.4%, respectively, for the 10, 20 and 30 g per ton levels.

There were no evident differences in eating patterns of cattle in the various treatment groups. The reduction in feed intake but with similar rates of gain and a resulting improvement in feed efficiency were consistent throughout the high-roughage phase of the experiment.

High-Concentrate Finishing Phase

Results of the high-concentrate finishing phase of the experiment are presented in table 2. Rates of gain were about the same between treatment groups except slightly lower for the highest level of monensin. Feed intake was reduced with increasing levels of the compound as occurred with the high-roughage rations. Feed efficiency was improved but slightly less than in the high-roughage phase. In this phase of the experiment, the improvement in feed efficiency for 10, 20 and 30 g per ton of monensin amounted to 1.7, 7.4 and 6.8%, respectively.

There were only small differences between treatment groups in the carcass characteristics measured except for a slight lower dressing percent and fat depth for cattle fed the highest level of monensin and making the lowest rate of gain. Abscessed livers were not reduced by the compound.

Table 2. Monensin for Growing and Finishing Cattle
High-Concentrate Finishing Phase
(Oct. 10, 1973 to Jan. 24, 1974--106 days)

	Monensin, g/ton air-dry feed			
	0	10	20	30
No. of animals	31	32	31	32
Avg. init. shrunk wt., lb.	909.9	911.1	914.9	909.7
Avg. final shrunk wt., lb.	1193.6	1190.4	1195.3	1180.0
Avg. daily gain, lb.	2.68	2.64	2.65	2.55
Avg. daily ration (air-dry), lb.				
Hay or haylage	3.15	3.07	2.93	2.87
Suppl.	1.29	1.22	1.09	1.04
Corn	17.84	17.24	16.26	15.81
Total	22.28	21.53	20.28	19.72
Feed/100 lb. gain (air-dry), lb.				
Hay or haylage	118	117	111	113
Suppl.	48	46	42	41
Corn	668	657	619	623
Total	834	820	772	777
Carcass data				
Number	30	30	31	30
Carcass wt., lb.	710.2	712.1	707.4	694.1
Dressing percent	59.35	59.91	59.21	58.87
Conformation[a]	21.2	21.4	20.9	21.0
Marbling[b]	5.3	5.4	5.4	5.2
Carcass grade[a]	19.0	19.1	19.3	18.9
Maturity[c]	23.0	23.0	23.1	23.0
Color[d]	4.7	4.6	4.8	4.6
Firmness[e]	5.4	5.1	5.3	5.2
% kidney fat	3.3	3.6	3.6	3.5
Loin eye area, sq. in.[f]	11.57 (30)	11.62 (29)	11.61 (28)	11.71 (24)
Fat depth, in.[f]	0.72	0.78	0.73	0.61
Condemned livers	6	11	7	13

[a]Prime = 23, choice = 20, good = 17.
[b]Modest amount = 6, small amount = 5.
[c]A maturity = 23, B maturity = 22.
[d]Light cherry red = 5, cherry red = 4.
[e]Firm = 6, moderately firm = 5.
[f]Some losses in carcass identification occurred in coolers. Values in parenthesis are number of carcasses for these characteristics.

Summary

Results of the experiment indicate that monensin reduces feed intake with either high-roughage or high-concentrate rations with little, if any, effect on rate of gain when fed at levels up to 30 g per ton of air-dry ration. These effects resulted in improved feed efficiency of 4.1, 8.1 and 10.4% with high-roughage rations and 1.7, 7.4 and 6.8% with high-concentrate rations for 10, 20 and 30 g of monensin per ton of air-dry ration. The effects appeared to be rather consistent throughout the two phases of the experiment. Levels of the compound used in the experiment appeared to have no important effects on carcass characteristics.